

In the Claims:

7 Claims 1-16 (Cancelled). §

17. (Previously Presented) An optical device comprising:
an optical substrate;
a lens element formed on said optical substrate;
an optical element; and
a supporting substrate supporting said optical element, said supporting substrate having a grooved surface with a groove formed therein;
wherein said optical substrate has a projecting part resting within said groove formed in said grooved surface of said supporting substrate so as to align said lens element with said optical element.

18. (Currently Amended) A method of fabricating the optical element element of claim 17, comprising:

using photolithography to define said projecting part; and
using photolithography to define said groove formed in said grooved surface of said supporting substrate.

19. (Previously Presented) The optical device of claim 17, wherein said groove formed in said grooved surface comprises a first groove, said supporting substrate having a second groove formed in said grooved surface, said projecting part of said optical substrate comprising a first projecting part, said optical substrate having a second projecting part resting within said second groove so as to align said lens element and said optical element.

20. (Previously Presented) The optical device of claim 19, wherein said supporting substrate has a third groove formed in said grooved surface parallel to said first groove and said second groove, said optical element comprising an optical fiber arranged in said third groove.

21. (Currently Amended) The optical device of claim 17, wherein said supporting substrate has a side adjacent to said optical substrate, said groove formed in said grooved surface extends extending to said side.

22. (Previously Presented) The optical device of claim 21, wherein said groove formed in said grooved surface comprises a first groove, said supporting substrate having a second groove formed in said grooved surface parallel to said first groove and extending to said side, said optical element comprising an optical fiber arranged in said second groove.

23. (Previously Presented) The optical device of claim 21, wherein said groove formed in said grooved surface comprises a first groove, said supporting substrate having a second groove and a third groove formed in said grooved surface, both said second groove and said third groove being formed parallel to said first groove and extending to said side, said projecting part of said optical substrate comprising a first projecting part, said optical substrate having a second projecting part resting within said second groove, and said optical element comprising an optical fiber arranged in said third groove.

24. (Previously Presented) The optical device of claim 17, wherein said supporting substrate is crystalline, and said groove formed in said grooved surface of said supporting substrate has a V-shaped cross section.

25. (Previously Presented) A method of forming the optical device of claim 24, comprising forming said grooved surface of said supporting substrate by etching said supporting substrate using an anisotropic etchant.

26. (Previously Presented) The optical device of claim 17, wherein said supporting substrate comprises:

a polymer substrate; and

a grooved resin layer arranged on said polymer substrate so as to form said grooved surface of said supporting substrate.

27. (Previously Presented) A method of forming the optical device of claim 26, comprising:
coating said polymer substrate with a photosensitive resin layer;
selectively exposing said photosensitive resin layer to light through an exposure mask so as to cure exposed portions of said photosensitive resin layer; and
removing uncured portions of said photosensitive resin layer so as to form said grooved resin layer.

b) 28. (Previously Presented) The optical device of claim 17, wherein said projecting part extends perpendicularly from a surface of said optical substrate and has a circular cross-section.

29. (Previously Presented) The optical device of claim 17, wherein said optical substrate comprises a quartz substrate, said projecting part comprising resin material attached to said quartz substrate.

30. (Previously Presented) A method of forming the optical device of claim 29, comprising:
coating said quartz substrate with a photosensitive resin layer;
selectively exposing said photosensitive resin layer to light through an exposure mask so as to cure exposed portions of said photosensitive resin layer corresponding to said projecting part; and
removing uncured portions of said photosensitive resin layer so as to form said projecting part.

31. (Currently Amended) The optical device of claim 17, wherein said projecting part and said optical substrate are formed of silicon and are formed as integrated to form a one-piece unit.

b1 32. (Previously Presented) The optical device of claim 17, wherein said lens element comprises a computer-generated hologram.

b2 33. (New) The optical device of claim 17, wherein said lens element is fixed to said optical substrate.

34. (New) The optical device of claim 33, wherein said optical substrate and said lens element are integrated to form a one-piece unit.

35. (New) The optical device of claim 33, wherein said lens element and said projecting part are fixed to said optical substrate.

36. (New) The optical device of claim 35, wherein said optical substrate, said lens element, and said projecting part are integrated to form a one-piece unit.